U.S. DEPARTMENT OF THE INTERIOR
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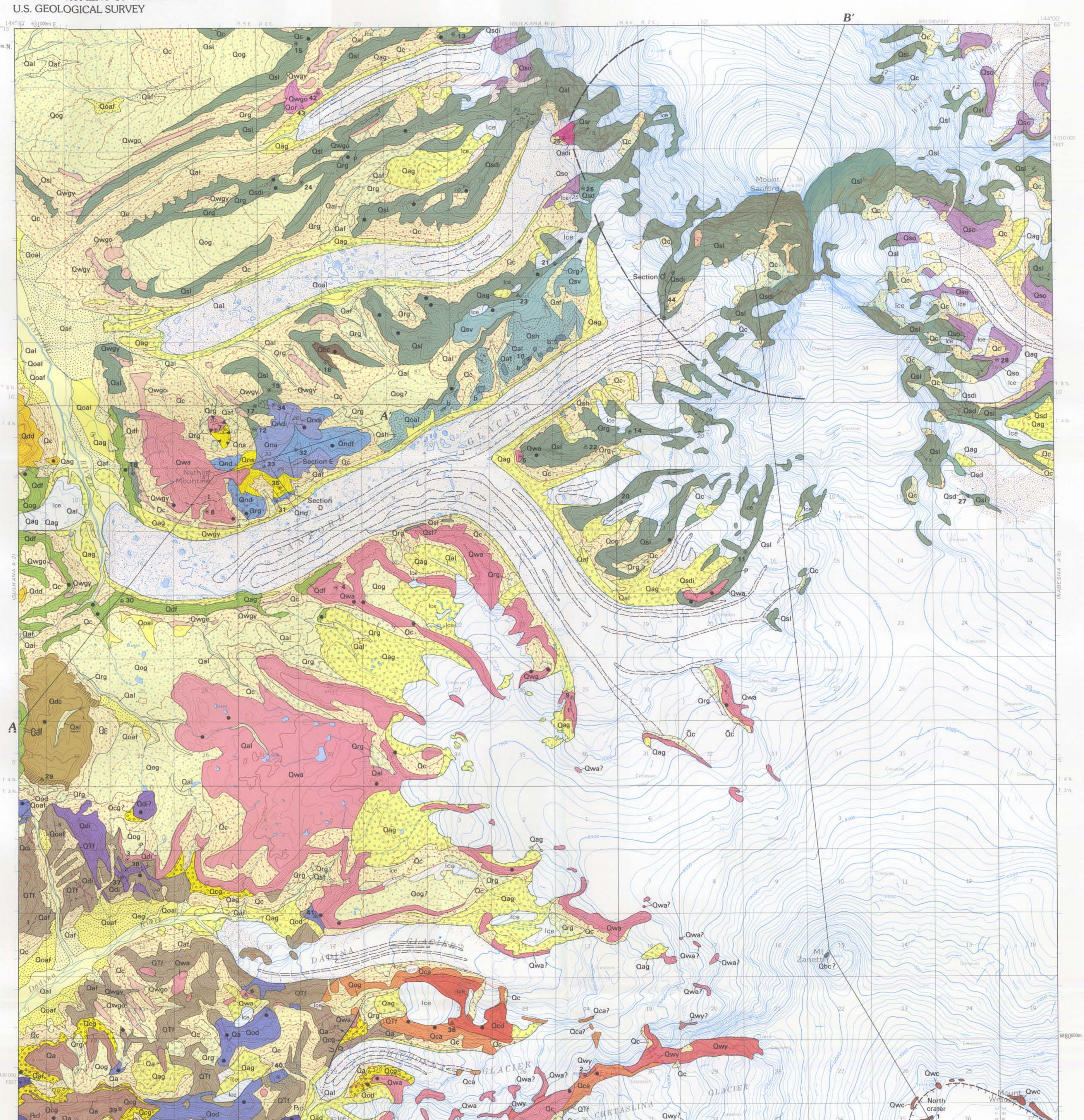


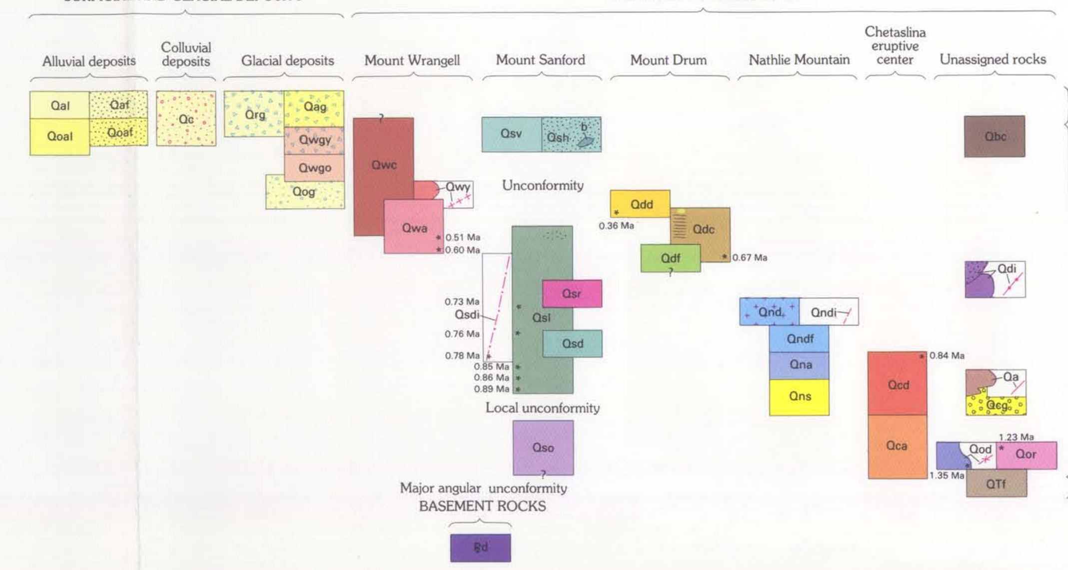


Figure 1. Mount Sanford as viewed from airport at Gulkana, located about 66 km to west. Open arrow, west Sanford eruptive center; closed arrow, north Sanford eruptive center. Clouds partially obscure spectacular south face of Mount Sanford.

Figure 3. Mount Wrangell as viewed from Willow Lake, located 64 km to southwest. Mount Zanetti, a large, ice-covered cinder cone, is north (to left) of broad summit of Wrangell. Photo by National Park Service.

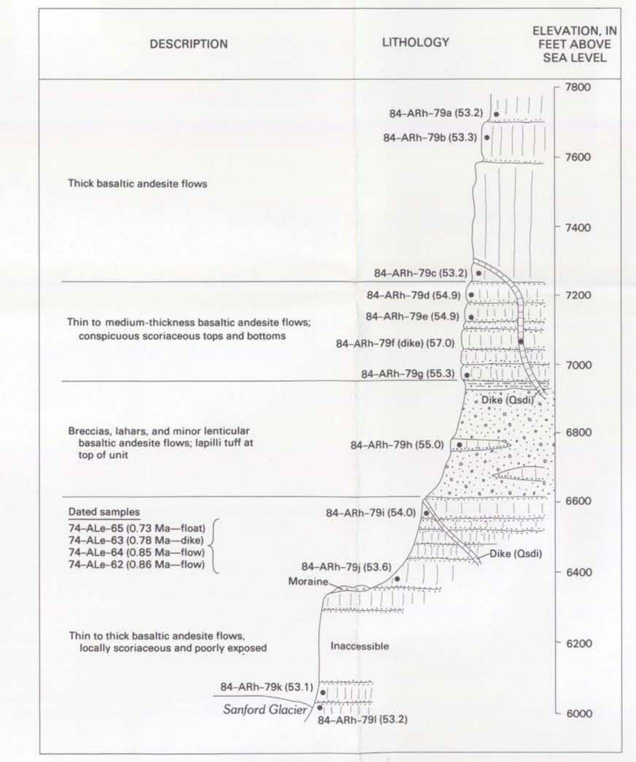


Figure 2. Sanford intracaldera(?) section (section C on map sheet), showing location of samples that were analyzed and dated. All samples are from unit Qsl except dikes, which are from unit Qsdi (see map sheet for unit descriptions). Samples that were chemically analyzed (dots) were collected along line of section C; sample number refers to table 3; silica content (in weight percent; analyses normalized to 100 percent, volatile free) shown in parentheses. Samples that were radiometrically dated by potassium-argon method (bracketed) were collected on bench near moraine (loc. 44 on map sheet); sample number refers to table 1; age and lithologic description shown in parentheses.

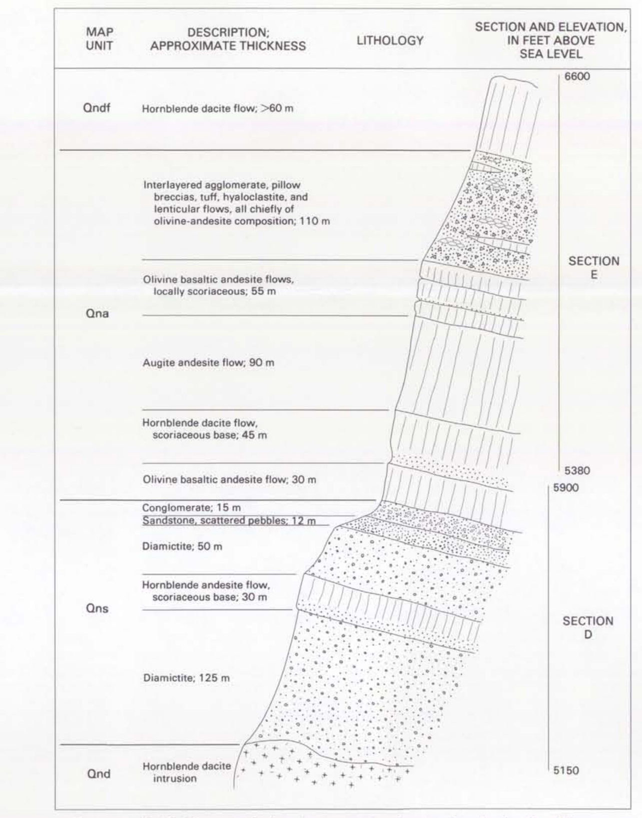


Figure 4. Nathlie Mountain tilted section, composite of two sections (section D and E on map sheet) at different elevations. Layers strike approximately N. 38° W. and dip 20° to 30° NE.

Contact—Known and inferred; queried where uncertain

Fault—Dashed where inferred (shown in cross section only); dotted where concealed. Showing dip where known. U, upthrown block; D, downthrown block

Ice-covered caldera margin—Hachures on side of caldera collapse. Shown as fault in cross section

Postulated caldera margin

Limonite staining—Shown in units Qod and QTf

Rock debris on active glacier—Includes medial, end, and ablation moraines, landslide deposits, debris flows, and talus. Dashed lines indicate most conspicuous rock stripes

Measured and projected orientation of bedding or flow layering—Shown in cross section only

Slide block—Sawteeth on block

Section line—See figures 2 and 4

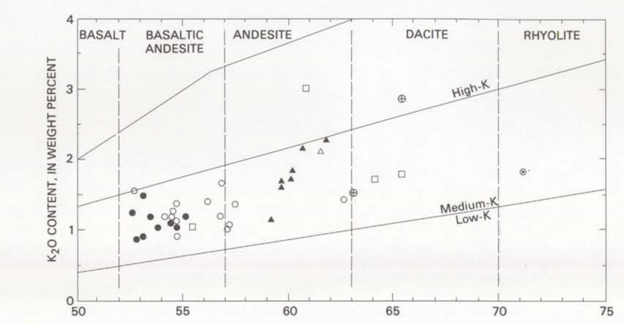
Sample localities—Numbers refer to tables 1, 2, and 3

Petrographic sample

Petrographic sample that was chemically analyzed

Petrographic sample that was radiometrically dated

Petrographic sample that was both chemically analyzed and radiometrically dated



EXPLANATION
[See Description of Map Units for explanation of unit symbols]

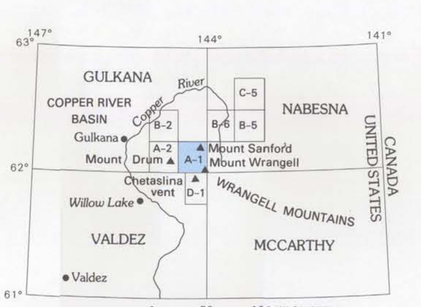
Sanford: ○ Qsl; ● Qsl (intracaldera?); ⊕ Qsd; ⊙ Qsr
Wrangell: ▲ Qwa; △ Qwy
Nathlie: □ Qnd, Qndf, Qna

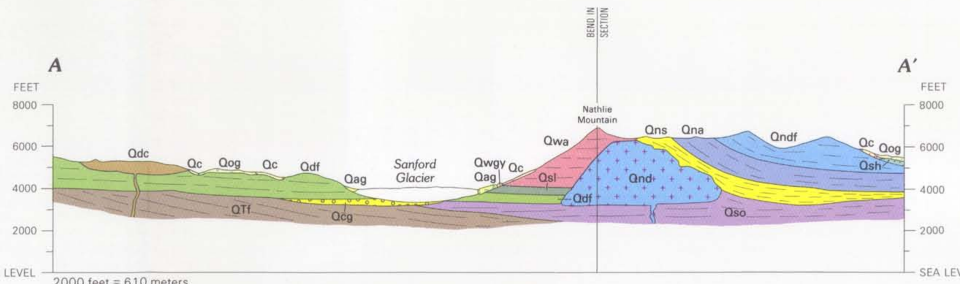
Figure 5. K_2O–SiO_2 variation diagram of lavas from Sanford, Wrangell, and Nathlie eruptive centers, showing rock nomenclature used in this report. Compositional-field boundaries (dashed lines) from Le Bas and others (1986); potassium (K) discriminant boundaries (solid lines) from Peccerillo and Taylor (1976). Chemical analyses given in tables 2 and 3.

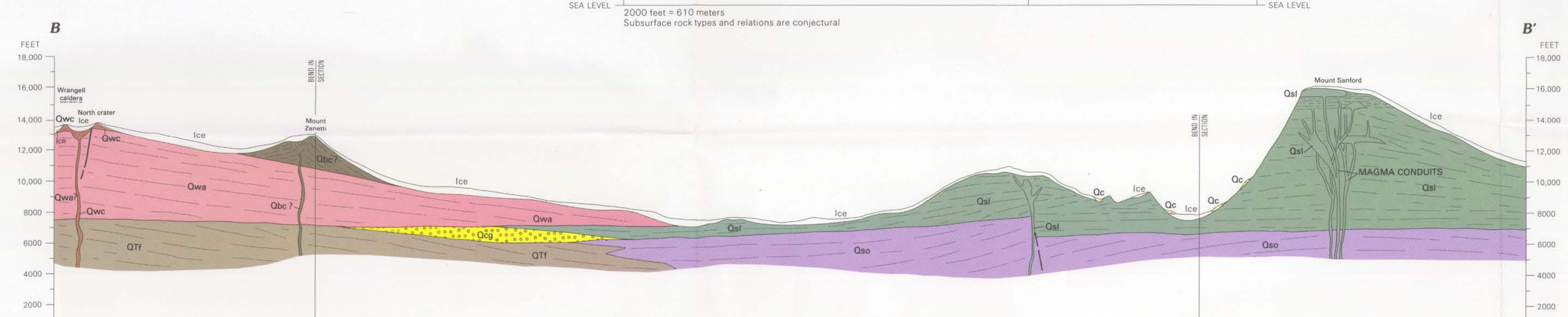
DISCUSSION

The Gulkana A–1 quadrangle is in the northwest part of the extensive (>10,000 km²) Wrangell volcanic field, which is of late Oligocene (26 Ma) to Holocene age (Richter and others, 1990), in the Wrangell Mountains of south-central Alaska. The quadrangle includes the northwest flank of Mount Wrangell and most of Mount Sanford, two very large shield volcanoes; Nathlie Mountain, a small volcanic ...

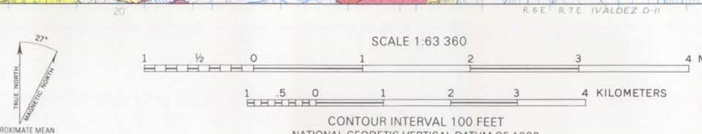
Some of the older late Pliocene to early Pleistocene volcanic rocks exposed in the quadrangle may be products of the Chetaslina eruptive center (Nye, 1983), whose principal vent is located 5 km to the south in the contiguous Valdez D–1 quadrangle. Whole-rock K–Ar ages on andesite flows from the Chetaslina vent area indicate that the volcano was active at least between about 0.98 and 1.68 Ma (Nye, 1983). The source for many of these older flows, breccias, and mudflows, however, is not known with ...







2000 feet = 610 meters
Subsurface rock types and relations are conjectural



2000 feet = 610 meters
Subsurface rock types and relations are conjectural

GEOLOGIC MAP OF THE GULKANA A–1 QUADRANGLE, SOUTH-CENTRAL ALASKA

By
D.H. Richter, W.A. Duffield, D.A. Sawyer, J.C. Ratté, and H.R. Schmoll

1994